white flowers, 238 with yellow flowers, these two being nearly a half of the whole number; then follow red, 144; purple, 94; blue, 87; green, 51; and miscellaneous, 38. Taking each colour by itself, and calculating the percentages of that colour which has come into flower by each month from April to July, we obtain the following results for the first five classes:—

	April.	May.	June.	July.
Blue	16	43	71	93
White	14	36	70	97
Purple	4	28	61	92
Yellow	9	24	61	93
Red	9	25	62	94

Thus of these colours, the *blues* are, on the average, considerably the earliest in flowering; then follow in order the *whites* and the *purples*, and lastly the *yellows* and *reds*. It follows that the plants included in the British flora clearly tend to arrange themselves, as regards the dates of flowering, in the order of the colours of the spectrum, the average earliest being those which are nearest the part of the spectrum where the actinic rays are at the maximum. It will be observed that the differently-coloured varieties of *Scilla bifolia* are in the same order of flowering of the plants of the same colours in the British flora. Accurate observations, continued from year to year, of the exact dates of flowering of different plants, and particularly of differently-coloured varieties of the same species, could not fail to contribute valuable data to the inquiry referring to the influence of the solar rays, in the development of the more important of the vital functions of plants in different seasons. Whilst it is quite true, as has been pointed out by Mr. R. A. Pryor in NATURE (vol. xiii. p. 150), that flowers of all colours bloom in any of the spring or summer months, it is plain that it is only the method of inquiry by averages that can guide us in the search for the law or laws which regulate the seasonal distribution of colour among flowers. It is scarcely necessary to refer to the importance of this question in its possible applications in the rearing of early and late varieties of flowers and fruits.

ALEXANDER BUCHAN

THE WORK OF THE "CHALLENGER" AND THE "VALOROUS"

THE Admiralty have just issued Reports on the Soundings and Temperatures taken by the *Challenger* in the Pacific, and by the *Valorous* during her voyage out with the Arctic Expedition and home again.

Captain Thomson's Report is dated from Honolulu, August 8, 1875, and refers to operations in the Inland Sea and to the section from Yokohama to Honolulu. After some days' cruising in the Inland Sea in May, Captain Thomson returned to Yokohama, nothing of interest to the scientific branch having been obtained. The deepest water found in the longitudinal section during the voyage to Honolulu was 3,980 fathoms, whilst that from the turning-point at 156° west longitude down to Honolulu was 3,025 fathoms. The bottom of this section of the North Pacific showed on nearly every occasion red clay, with manganese and pumice-stone in great quantities; the latter greatly increased as the approach to the Sandwich Islands was made.

Staff-Commander Tizzard makes his preliminary Report on the Temperatures of the North Pacific. From Samboangan nineteen soundings and serial temperatures were obtained in the western part of the North Pacific, from which two sections have been constructed, one from the Meangis Islands to the Admiralty Islands, and the other from the latter to Japan. It was found that when the depth exceeded 1,500 fathoms, the thermometer which regulated the bottom temperatures gave the same results as they did at 1,400 fathoms, viz. 34°·4 (corrected). At a little to the southward of Tongatabu, the bottom temperature was 32°·9, and as the U.S. officers appear to have obtained colder temperatures at the bottom than any yet obtained by the *Challenger* in the North Pacific, Commander Tizzard thinks it probable that the bed of the Pacific is divided into at least three deep basins by ridges of a not greater depth than 1,400 fathoms from the surface. In the southern part of the western portion of the North Pacific the surface-temperature varied from 80° to 84°, and that in February and March, considerably higher than any yet registered by the *Challenger* in the open ocean.

The Report contains a table of the soundings in the above sections, and four beautifully-constructed sectional charts. The two first show the soundings and isothermal lines from the Meangis to the Admiralty Islands, and between the latter and Japan. The third is intended to illustrate Staff-Commander Tizzard's remarks on the surface temperature of the section referred to above; and the fourth shows the soundings and isothermal lines between Nosema Head, Japan, and the 180th meridian. One of the most notable features of these charts is the occasional sudden increase in depth; between Japan and the Admiralty Islands, for example, the bottom sinks at one place all at once from about 2,000 fathoms, on both sides, to a depth of 4,500 fathoms.

The *Valorous* on her outward voyage took nineteen soundings in Davis' Straits between 63° 45′ and 68° 57′ N. lat., the depth being found to vary from 58 to 200 fathoms. The bottom was mostly fine grey sand, mixed with shells, gravel, and stones. On returning south, lower soundings were obtained along the Greenland coast, with much the same results as to bottom. On getting clear of Cape Farewell the course was shaped to cross the Atlantic Ocean between the parallels of 59° and 55°, and to join the soundings westward of Ireland obtained in the *Porcupine* in 1862. The greatest depth obtained was 1,860 fathoms in lat. 57° 50′ N., and 44° 52′ W. long., with a bottom of Globigerina ooze, and a bottom temperature of 33°·4. In 56° 11′ N. lat. and 37° 41′ W. long. a depth of 1,450 fathoms was obtained, the bottom Globigerina ooze, and next day in lat. 56° 1′ N., long. 34° 42′ W., a submarine ridge of 690 fathoms was sounded on with the same description of bottom. On the day following this, in lat. 55° 58′, long. 31° 41′ W., the depth increased to 1,230 fathoms, mud; the deep sounding of this day and that of the second day previous being equidistant (103 miles) from the intervening shoaler ridge of 690 fathoms. On reaching the 26th meridian of W. long., a westerly gale commenced, which prevented further proceedings. Globigerina ooze, with occasional fine sand and mud, are the main characteristics of this section. Two sectional charts exhibit graphically the data obtained.

SCIENCE IN GERMANY

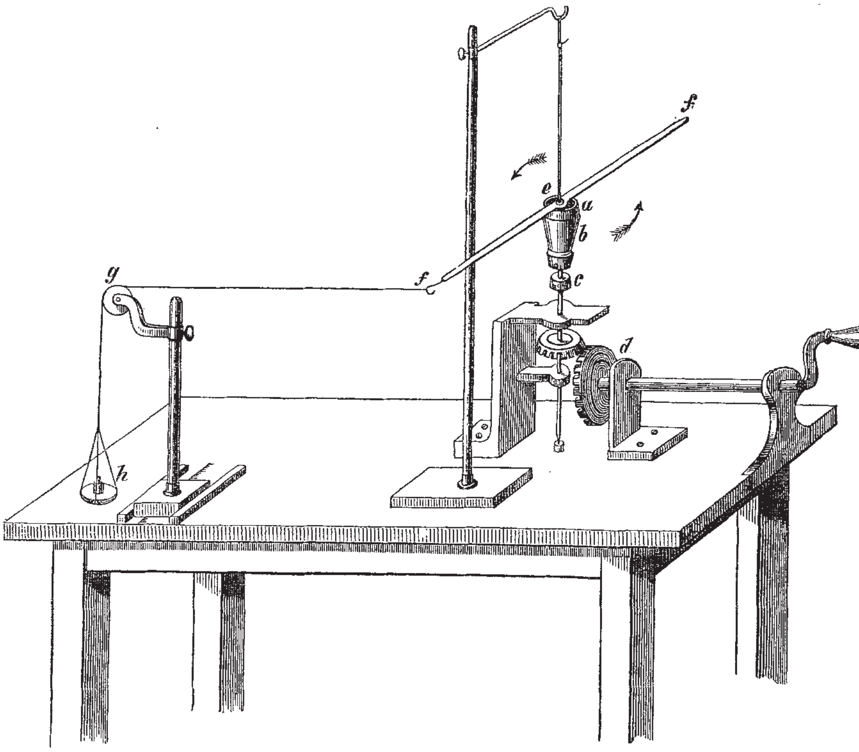
(*From a German Correspondent.*)

M. PULUJ, of Fiume, has recently published a description of a school-apparatus for determining the mechanical equivalent of heat. The apparatus is of very simple construction, and consists of a calorimetrical and a dynamometrical part, which is connected with a rotating arrangement, such as may be found in any physical laboratory.

The calorimetrical part of the apparatus is formed of two truncated hollow cones of cast iron, fitting the one into the other. The inner one, *a*, does not quite reach to the bottom of the outer, *b*, and it projects a little above it. The outer cone, *b*, can be fixed, coaxially, into the spool of the driving machine. The inner cone contains mercury. If, now, the driving machine be set a-going and the inner cone held fast, heat is produced through friction of the touching surfaces of the cones.

For measurement of the work transformed into heat, the arrangement is as follows:—To the wooden lid, *e*, of

the inner cone, is screwed a light wooden beam, *f*, horizontally. Through the beam and lid passes a perforation for receiving the thermometer. At a little distance from the beam, *f*, and at the same height, there is a fixed pulley, *g*, over which is passed a cord with a scale at its pendant extremity, while the other end is attached to the end of one arm of the beam (the second arm of the beam acts as counter weight). When the driving machine is put in action, the cones rub together, and the outer cone tends to carry the inner one and its beam round with it in the direction of rotation. With a certain weight in the scale, the horizontal part of the cord will form with the axis of the beam a right angle. From the length of the beam-arm, the amount of weighting, and the number of rotations, may be deduced the work that is transformed into heat; and from the water value of the calorimeter,



and the increase of its temperature, can be reckoned the quantity of heat produced.

From twenty-eight experiments (in which the amount of heat radiated from the calorimeter was taken into account), the average value obtained for the mechanical equivalent of heat was 425·2, with a mean error ± 5·4. A second series of experiments was made, with the arm of the beam in any position with reference to the cord. A simple arrangement—wooden triangle with arc-division—served for measuring the angle which the axis of the beam-arm formed with its normal position (in which it forms a right angle with the cord). From the observed values of this angle, and from the quantities already referred to, the number obtained for the mechanical equivalent of heat was 426·7, with a mean error ± 5·9.

The apparatus is especially to be recommended for lecture-experiments, because the method of experimenting is extremely simple, and the carrying out of the experiment takes very little time. A single experiment occupies 30–60″.

S. W.

THE PHYSICAL OBSERVATORY ON THE PIC DU MIDI

AT a recent sitting of the Paris Academy of Sciences M. Ch. Sainte-Claire Deville made a communication, with reference to the proposed Physical Observatory on the Pic du Midi, in the Pyrenees. He referred to the increasing importance of meteorology, and to its manifold extensions and development in recent years, and to the growing necessity of establishing numerous fixed stations at as high an altitude as is practicable. This has already been done to a considerable extent in India, in America, and in some parts of Europe; in France, as we have already intimated, the Puy de Dôme Observatory is nearly completed. M. Deville then referred to the importance of having a station on the Pyrenees, and to the difficulty of choosing a suitable site. The Pic du Midi de Bigorre, however, unites in itself all the most favourable circumstances. Situated towards the middle of the chain of the Pyrenees which receive directly the shock of the Atlantic storms, the Pic du Midi stands out from the general crest, and rises to a height of 2,877 metres, only 527 metres below the highest summit of the chain. It commands a magnificent and extensive panoramic view, and is easily accessible from various points. From the sixteenth century downwards it has attracted tee attention of men of science, and during the last and th- present century a considerable number of notable ob servers have resorted to the Pic for the purpose of carrying on observations. Darcet, in 1786, obtained from Philippe d'Orleans the promise of 80,000 francs to found an observatory on the mountain, but the political events which rapidly succeeded prevented the scheme from being carried out. Even then a small hut existed on the spot where the Commission, charged by the Ramond Society with carrying out the present scheme, have built another; the former had been built by Vidal and Reboul, who in 1786-7 surveyed the Pic. Ramond, in the early part of